Replication Study
Producing an Export Import Price Index (XMPI) in Bhutan

Contents

I.   Background

1.   The National Statistics Bureau (NSB) is the main agency responsible for producing statistics to support evidence-based decision making in Bhutan. One of the responsibilities of NSB is to produce economic statistics to monitor and assist policy makers in framing good policy for sustainable economic development. Price statistics is an important macro-economic indicator for monetary and fiscal policy making. NSB currently compiles the monthly Consumer Price Index (CPI) and the quarterly Producer Price Index (PPI) only.

2.   The development of Export and Import Price Index (XMPI) for Bhutan is an important step in strengthening and improving the economic statistics in the country. The need for XMPI has been highlighted in the country assessment of Bhutan Statistical System by ESCAP in 2011. The index is part of the core sets of economic statistics measuring average price change of goods and services exported and imported. It also serves as fundamental input to the national accounts as deflator to measure the growth rate.

A.   Rationale

3.   Developing an export import index will substantially improve the GDP estimates. Currently, in absence of an XMPI, CPI is used for deflating the export and import component of the GDP by expenditure approach. Using the CPI, however, biases the GDP estimate due to differences in valuation, composition of baskets and share of each item within the baskets. For example, electricity is a major export for Bhutan contributing to about 40% of the total exports while CPI reflects a share of 2.31% of the total consumption expenditure. Thus, if the export price of electricity is increased, it will have substantial impact on the export index while it will not impact the CPI as the prices have not been changed for the household or vice versa. Even if both the prices are increased equally at the same time, the impact to the overall index for XMPI and CPI will vary substantially due to the difference in its share to the total value. Given these differences, the use of these two indices for deflating GDP for export and import component will give different estimates. Therefore, having an XMPI will produce an accurate measure of the estimates.

4.   Bhutan is a highly import driven economy and having an XMPI is extremely useful, serving as a lead indicator of the inflationary trend expected to occur at the consumer level. Any increase in the price of imported commodities at the point of entry will be passed on to final consumers. This will alert both consumers and policy makers about the expected inflation in the market. Such information will help in developing interventions to control inflation in the market.

5.   The quality of administrative data made it relatively easy to develop the XMPI. The Department of Revenue and Customs (DRC) compiles and publishes trade statistics quarterly. Since trade data are compiled and produced on regular frequency by the customs office, the statistics office can come up with a quality index without involving any additional human resources, time and financial support. It contains information on unit of measurement, quantity

and value of export and import by countries at the eight-digit level of the Bhutan Trade Classification Code (BTC) which is at a detailed level. The published data is also available in excel format which provides much convenience and flexibility for compiling the index.

II.   How was the project conducted?

Figure 1 – Project phases to produce the XMPI for Bhutan

1. Data assessment and planning
2. Undertake mission clarify expectation, meet stakeholders and assess data
3. Propose data sources and methods for compilation
4. Finalize report and agree on implementation plan
5. Develop compilation system and documentation
6. Undertake second mission to train the staff in implementatiion
7. Prepare and finalize report for publication

A.   Data assessment and planning

6.   The XMPI was a joint collaboration between ESCAP and NSB. ESCAP sent an international expert to give technical support while NSB was responsible for gathering data and arranging meetings with stakeholders. ESCAP was the overall coordinator for the implementation of the project. They were responsible for recruitment of international expert, managing the overall implementation of the project in coordination with NSB and the consultant.

7.   The work to develop XMPI began in 2017. Two rounds of visits were conducted, first in July 2017 and the second in May 2018. The first priority was to assess the data availability and suitability of trade statistics data to compile the index, meet the stakeholders and propose a methodology for the compilation of index. The second was to finalize the documentation and train the NSB staff in computing the index independently moving forward.

8.   Prior to the first mission, NSB acquired data from DRC and sent to consultant for review. The trade data was found reliable and fit for purpose to compile the XMPI. However, some inconsistent data were also identified and alternative data sources like the PPI and Import Price Index of US were recommended to be used for commodities where the trade data was not reliable. The exchange of data and pre-mission communications between the consultant, NSB and ESCAP was helpful in preparing for the first mission that took place in July 2017.

B.   Consultation

9.   During the first mission in July 2017, NSB team and the consultant met with DRC team. The meeting was to inform DRC about the project and seek their support in supply of data on regular and timely basis.

10.   There was also a meeting with national accounts team as XMPI is a key input to the national accounts. The meeting provided an idea of the current compilation system, deflators used for export and import values, and other related issues. The national accounts acknowledged the initiative and requested if there is possibility to compile the index for longer back series from year 2000. They also suggested if services component could be included. However, the trade data does not include export and import of services and although the Royal Monetary Authority has data on export and import of services, it is at the more aggregate level and lacks detail that is required to develop services index. On the other hand, given the complicated nature of price collection for the services, it could not be included in the current compilation without significantly increasing the development and compilation resources that would have been required.

C.   System development

11.   Following the first mission, the consultant came up with a detailed report with main focus on the sources of data and methodology to be used for the compilation of the index. An excel based worksheet was developed for the compilation of the export and import price index. Price team in NSB currently uses the excel to compile both the CPI & PPI and are familiar with the excel worksheet. Hence, an excel based compilation system was developed by the consultant so that NSB team will be able to take up the work easily without requiring any further trainings.

12.   A detailed documentation of the steps and process involved in the compilation of the index was developed. The documentation was to institutionalizing a proper system of compilation to be followed and ensure continuity and consistency of the index compilation especially when there is change in the compiler from time to time. Thus, the documentation will serve as an important reference and guideline to the compilers as well as users.

13.   A preliminary XMPI beginning first quarter 2014 till third quarter 2017 has been prepared by the consultant and was handed over to the NSB during the second mission in May 2018. The consultant trained the NSB staff through the data processing, cleaning and calculation of index so that NSB will be able to carry on the compilation work independently. during the second mission, NSB team proposed its plan to publish the index officially in first quarter of 2019. The timeline was set with the intention to get familiar with the worksheet that has been developed, solve any technical issues with the consultant if required and gather up to date data for publishing. However, NSB was unable to publish the index as planned due to delay in timely submission of data from the key stakeholder (DRC). The other reason being inadequate staff in price section and engagement of the available staff on other priorities and regular works.

D.   Data compilation and editing

Department of Revenue & Customs

14.   The Department of Revenue & Customs (DRC) publishes quarterly trades statistics with information on the value and quantity of goods exports and imports. The quarterly data is at the export/import customs entry level for each Bhutan Trade Classification (BTC) eight-digit code. Calendar quarterly data for Q1, Q2 and Q3 of each calendar year is provisional when first supplied by DRC. DRC also provides final annual data for the calendar year when supplying final data for Q4. DRC has agreed to provide NSB with quarterly data in excel format with a standard agreed format.

15.   Provisional data for Q1, Q2 & Q3 and final data for Q4 is used to derive the quarterly prices (i.e. unit values) used to compile the quarterly price indexes. The final annual data is used to reweight the price baskets annually.

16.   The DRC's published data on export and import originating from India is valued at free-on-board (FOB) value while imports originating from countries other than India are valued at cost, insurance and freight (CIF) value. Given the valuation in the national accounts is at FOB value, the export and import values need to be consistent with the national accounts estimates. The DRC agreed to provide the import from countries other than India in FOB value.

17.   Quarterly trade statistics data from DRC has the following details:
- Date
- Destination
- BTC code (Eight-digit level)
- Full description of the item
- Unit of measurement
- Quantity
- Value (FOB)

Druk Green Power Corporation

18.   Druk Green Power Corporation provides monthly data on the value and quantity of electricity exports and imports, for each plant. This data is mainly used to reselect and reweight the price baskets annually.

Producer Price Index

19.   Some export prices collected for and used in Bhutan's Producer Price Index (PPI) are also used in the Export Goods Price Index. PPI prices are used where unit values derived from DRC's trade data are unreliable, and for electricity exports and imports.

Overseas price indexes

20.   The United States Import Price Index (US IPI) is used as a proxy for Bhutan's imports of mechanical machinery (BTC Chapter 84), electrical machinery (BTC Chapter 85) and aircraft and aircraft parts (BTC Chapter 88), as the unit values based on Bhutan's imports are neither sufficiently reliable nor sufficiently representative of these three chapters. The US import price indexes for these three chapters are adjusted for changes in the Ngultrum/US dollar exchange rate.

21.   The US IPI is of good quality, covers imports from a wide range of countries including those in Asia, is available at the required level of detail, uses a classification system that aligns with the BTC chapters, and is accessible and timely.

E.   Data processing

22.   The XMPI is computed mainly using the unit value prices derived from the trade data. Unit values have both strengths and weaknesses. Because the unit values are calculated across all products exported under each BTC code during the quarter and because the mix of products can change from quarter to quarter, unit values based on international trade data are usually less stable than prices for more tightly specified products.

23.   A potential weakness is that part of the movement in unit values may not strictly represent price change; for example, it may represent a different mix of two products with different, but unchanged, prices. However, across the basket, over the medium term, the selected price baskets are expected to provide a fit-for-purpose measure of price change, provided unit values are closely monitored, and outlier entries excluded where necessary. A strength of unit values based on international trade data is that they cover all transactions, rather than only the prices of a sample of products.

24.   The coefficient of variation (the ratio of the standard deviation to the mean, expressed as a percentage) is a statistical measure of relative variability. Coefficients of variation were used to assess the stability and reliability of the unit values for BTC codes and hence their suitability for inclusion in the price baskets.

25.   Selecting BTC codes with relatively low coefficients of variation for the price baskets helped give confidence that variation in the unit-value time series of items in the price baskets would not be unduly influenced by change in the mix of products. Following are the factors taken in to account when reselecting and updating the baskets annually:
   a) Items with high FOB values
   b) Quarterly unit values
   c) Coefficients of variation (CVs)
   d) Counts of number of quarters that unit values are present during the latest nine quarters.

26.   The following are the processes carried to assess the unit value data derived for use in index:
   a) Check for any missing values/quantities and consistency in unit of measurements
   b) Monitor the quarterly FOB values to ensure they are not too low to support reliable unit values.
   c) Run checks on the item unit values and, where necessary, investigate the data at the entry level to assure quality and identify entry-level outliers.
   d) Adjust unit values, where necessary, to exclude entry-level outliers and add cell comments to flag and document these edits.
   e) Monitor the 'coefficients of variation' of the basket-item time series (based on the rolling latest nine quarters) to ensure the unit-value time series remain reliable enough to use.

III.   Project Results / Outcomes

27.   The XMPI report is yet to be published and NSB plans to publish it by the end of 2019. The following are the expected outcomes and results of the project:

- The project as intended will strengthen the economic statistics for Bhutan through development of XMPI. This will contribute to NSB's vision of providing evidence-based decision making in the country. It will further add to the already existing price indices such as CPI and PPI. NSB plans to inform and disseminate the XMPI report to its key users such as Central Bank and the Ministry of Finance using the existing data sharing mechanism.   This will enable the users to get a comprehensive picture of the inflationary trends at different levels of the economy. Being a highly import driven economy, such indices will be of immense use for the economic policy making.

- Better GDP estimates through use of XMPI for deflating the export and import component of the national accounts.

- XMPI will serve as a lead indicator of the inflation at the consumer level, thus, alerting the policy makers in monitoring the inflation rates in the economy

- The working arrangements through fielding of international experts with NSB has benefited the organisations in strengthening the capacity of its staff. NSB team got hands on training from the consultant how to process, validate and edit price data which are essential in producing quality statistics.

- The project also assessed the current price compilation systems and recommended improved methodologies for the compilation of other indices such as CPI and PPI. The recommendations have been considered and will be implemented while rebasing the CPI this year. For example- currently geometric laspeyres is used to aggregate higher level index for PPI and CPI, however, the consultant recommended the use of arithmetic laspeyres as a better option than the existing one.

IV. Lessons learned and recommendations

A. Administrative data (trade statistics) fit for XMPI

28. Given that customs office in most countries compile the trade statistics, statistical office can make use of these existing administrative data to compile the XMPI. Initially NSB proposed for a separate survey to be carried out to collect the prices on quarterly basis to compile the XMPI and intended to use the customs data only for developing weights. A separate survey would have been costly and time consuming for the statistical office to implement. Hence, the project opted to explore the existing administrative data to assess the suitability for producing the XMPI as this would be cost effective and less time consuming to NSB. The initial assessment of the data revealed that the customs data is good enough and fit for purpose to compute the XMPI. This has made the implementation much easier than a separate survey that was initially thought of. Therefore, considering the resource constraints the statistical offices in developing economies face, customs data can be a good starting point to compile the XMPI.

B. Use of existing system of compilation

29. An excel based worksheet has been developed for compiling the XMPI as is the case for compilation of the CPI and PPI. The NSB team is familiar using excel based compilation and were comfortable working with the excel based worksheet developed for XMPI. Using the existing system of compilation will mean minimal training and time required as compared to adopting a new system. However, the excel system also poses risk of inadvertent error being introduced and not detected. Thus, a robust system to avoid such errors and ensure quality needs to be explored in future.

C. Establish good linkage with the customs office

30. Lack of institutional arrangements in sharing data among users and producers in the Bhutan Statistical System is a major challenge in timely publication of statistics. Although, NSB initially had good support from customs office in sharing the trade data, receiving the

data regularly on time is a challenge and hence delay in publication. Thus, establishing a good institutional mechanism between the statistics office and customs office is a must to ensure timeliness and continuity in publishing the XMPI.

D. Capacity building through fielding of experts

31. The ESCAP fielded international price expert to assist in developing the index. Such arrangements are not just effective and helpful in delivering the expected output, but also provides opportunity for the local staff to work together with the expert and gain good knowledge in the respective field, thus, strengthening the capacity and beneficial for the office in long term.

E. Documentation and manual

32. The consultant aside from developing the system for compilation of the index has also developed a detailed documentation of the processes and methodologies in the computation of the index, selecting the basket and updating the weights annually. These documentation/manuals will serve as institutional documents and guide the compilers in ensuring good quality of data. NSB currently does not have such institutional setup of documentation and hence faces issues of smooth transition of work from one focal to another. Therefore, preparing such documents/manual is essential for other statistical products to have proper institution setup and ensure good quality of data.

F. Conclusion

33. The trade statistics data from the customs department is a good starting point for economies planning to develop an export and import index. Although there are issues around the use of unit value prices in measuring the true price change, it can be used provided proper checks and monitoring of the data is done. Since trade data are compiled and produced on regular frequency by the customs office, the statistics office can come up with a quality index without involving any additional human resources, time and financial support. Therefore, those economies without XMPI currently are encouraged to make use of the available trade data to produce the XMPI.

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